

APPLICATION NO. 10/694826

May 17, 2005

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CLAIMS 1-11 (CANCELLED)

12. (Currently Amended) A semiconductor device comprising:

a semiconductor substrate;

a copper wiring formed above said semiconductor substrate;

a silicon carbide layer covering said copper wiring; and

a first silicon oxycarbide layer covering said silicon carbide layer,

said first silicon oxycarbide layer containing hydrogen and having a carbon content of at least about 18 at% and a specific dielectric constant of at least 3.0 and at most about 3.1; and

said first silicon oxycarbide layer exhibiting higher adhesion, hardness and Young's modulus compared to carbon oxycarbide having 32.0 wt% hydrogen, 16.1 wt% carbon, 33.7 wt% oxygen, and 18.2 wt% silicon and having specific dielectric constant of 2.9.

13. (Original) The semiconductor device according to claim 12, wherein said carbon content of said first silicon oxycarbide layer is at most 25 at%.

14. (Currently Amended) ~~The semiconductor device according to claim 12;~~

A semiconductor device comprising:

a semiconductor substrate;

a copper wiring formed above said semiconductor substrate;

a silicon carbide layer covering said copper wiring; and

a first silicon oxycarbide layer covering said silicon carbide layer,

said first silicon oxycarbide layer containing hydrogen and having a carbon content of at least about 18 at% and a specific dielectric constant of at most about 3.1; and

further comprising a second silicon oxycarbide layer formed on said first silicon oxycarbide layer, said second silicon oxycarbide layer having the carbon content at least 1 at% smaller than the carbon content of said first silicon oxycarbide layer.

15. (Original) The semiconductor device according to claim 12, further comprising a low dielectric constant insulating layer formed on said first silicon oxycarbide layer, said low dielectric constant insulating layer having a specific dielectric constant lower than a specific dielectric constant of silicon oxide.

16. (Currently Amended) A semiconductor device comprising:  
a semiconductor substrate;  
a copper wiring formed above said semiconductor substrate;  
a silicon carbide layer covering said copper wiring; and  
a first silicon oxycarbide layer covering said silicon carbide layer,  
said first silicon oxycarbide layer containing hydrogen and having a hydrogen content of at most 30 at% and a specific dielectric constant of at least 3.0 and at most about 3.1; and  
said first silicon oxycarbide layer exhibiting higher adhesion, hardness and Young's modulus compared to carbon oxycarbide having 32.0 wt% hydrogen, 16.1 wt% carbon, 33.7 wt% oxygen, and 18.2 wt% silicon and having specific dielectric constant of 2.9.

17. (Original) The semiconductor device according to claim 16, wherein said hydrogen content is at most 28 at%.

18. (Currently Amended) ~~The semiconductor device according to claim 16,~~

A semiconductor device comprising:

a semiconductor substrate;

a copper wiring formed above said semiconductor substrate;

a silicon carbide layer covering said copper wiring; and

a first silicon oxycarbide layer covering said silicon carbide layer,

said first silicon oxycarbide layer containing hydrogen and having a hydrogen content of at most 30 at% and a specific dielectric constant of at most about 3.1; and

further comprising a second silicon oxycarbide layer formed on said first silicon oxycarbide layer, said second silicon oxycarbide layer having the hydrogen content at least 2 at% larger than the hydrogen content of said first silicon oxycarbide layer.

19. (Original) The semiconductor device according to claim 16, further comprising a low dielectric constant insulating layer formed on said first silicon oxycarbide layer, said low dielectric constant insulating layer having a specific dielectric constant lower than a specific dielectric constant of silicon oxide.

20. (Currently Amended) A semiconductor device comprising:

a semiconductor substrate;

a copper wiring formed above said semiconductor substrate;

a silicon carbide layer covering said copper wiring; and

a first silicon oxycarbide layer covering said silicon carbide layer,

said first silicon oxycarbide layer containing hydrogen and having a carbon content of at least 17 at% or a hydrogen content of at most 30 at% and a specific dielectric constant of at least 3.0 and at most about 3.1; and

said first silicon oxycarbide layer exhibiting higher adhesion, hardness and Young's modulus compared to carbon oxycarbide having 32.0 wt% hydrogen, 16.1 wt% carbon, 33.7 wt% oxygen, and 18.2 wt% silicon and having specific dielectric constant of 2.9.

21. (Currently Amended) ~~The semiconductor device according to claim 20;~~

A semiconductor device comprising:

a semiconductor substrate;

a copper wiring formed above said semiconductor substrate;

a silicon carbide layer covering said copper wiring; and

a first silicon oxycarbide layer covering said silicon carbide layer,

said first silicon oxycarbide layer containing hydrogen and having a carbon content of at least 17 at% or a hydrogen content of at most 30 at% and a specific dielectric constant of at most about 3.1; and

further comprising a second silicon oxycarbide layer formed on said first silicon oxycarbide layer, said second silicon oxycarbide layer having the carbon content at least 2 at% lower than the carbon content of said first silicon oxycarbide layer or the hydrogen content at least 2 at% larger than the hydrogen content of said first silicon oxycarbide layer.

22. (Original) The semiconductor device according to claim 20, further comprising a low dielectric constant insulating layer formed on said first silicon oxycarbide layer, said low dielectric constant insulating layer having a specific dielectric constant lower than a specific dielectric constant of silicon oxide.

CLAIMS 23-30 (CANCELLED)